

WHAT IS CLAIMED IS:

1. A brake device having a fluid pressure source device which generates a fluid pressure based on operation of a brake operating member, the brake device actuated by the fluid pressure generated by the fluid pressure source, comprising:

5 a brake operating amount detector which detects an operating amount of the brake operating member,

a fluid source pressure detector which detects the pressure generated in the fluid pressure source device, and

10 a failure detector which detects types of failures distinctively of the brake device based on the pressure detected by the fluid source pressure detector and the amount of the brake operation detected by the brake operating amount detector.

15 2. A brake device as in claim 1, wherein the failure detector detects and distinguishes the types of the failures between a case in which the pressure detected by the fluid source pressure detector at the time when the detected amount of the brake operation is a second predetermined amount of operation which is smaller than a first predetermined amount of operation is smaller than the second predetermined pressure which is larger than the first predetermined pressure, and a case in which the pressure is larger than the second predetermined pressure, and if the pressure detected by the fluid source pressure detector at a time when the amount of the brake operation

20 detected by the brake operation amount detector is the first predetermined amount of operation is smaller than the first predetermined pressure.

25 3. A brake device as in claim 2, wherein the fluid pressure source device includes ① a master cylinder which generates the fluid pressure corresponding to the input power, and ② a booster which increases the operation power of the brake operating member and outputs an increased operation power to the master cylinder,

the fluid source pressure detector includes a master cylinder pressure detector which detects the pressure of the master cylinder or a connected portion of the master cylinder, and

30 the failure detector detects the failure of the booster if the pressure of the master cylinder at the time when the amount of the brake operation is the second predetermined amount of operation is larger than the second predetermined pressure, and detects the failure of the fluid leakage of the brake device if the pressure of the

master cylinder at the time when the amount of the brake operation is the second predetermined amount of operation is smaller than the second predetermined pressure.

4. A brake device as in claim 3, wherein the failure detector includes a bottoming detector which detects a bottoming condition in the master cylinder.

5 5. A brake device as in claim 4, wherein the brake operating amount detector includes an operation power detector which detects the power supplied to the brake operating member, and

the bottoming detector detects the bottoming condition based on whether an increasing gradient of the operation power detected by the brake operating amount detector is larger than the predetermined gradient or not.

10 6. A brake device as in claim 5, further comprising a brake fluid control device which controls the brake fluid pressure in a different way based on the type of the failure detected by the failure detector,

15 the fluid source pressure detector includes a master cylinder pressure detector which detects the pressure of the master cylinder or a connected portion of the master cylinder,

20 the failure detector detects a small amount fluid leakage failure if the master pressure detected by the master cylinder pressure detector at the time when the brake operation detected by the brake operating amount detector is the first predetermined operation is larger than the first predetermined pressure, and a decreasing gradient of the master pressure detected by the master cylinder pressure detector is larger than the predetermined gradient,

25 the brake fluid control device includes a leak amount control device which increases the supplying amount of the fluid to the brake, if the failure detector detects the small amount fluid leakage failure, from a supplying amount of the fluid when the large amount fluid leakage failure is detected.

7. A brake device as in claim 5, wherein the fluid pressure source device is a master cylinder which has two pressure chambers and generates the fluid pressure corresponding to the input power,

30 and includes a front side brake connected to one of the two pressure chambers and a rear side brake connected to the other pressure chamber,

the fluid source pressure detector includes a front wheel side pressure detector which detects the fluid pressure of the pressure chamber which is connected

to the front wheel side brake or a portion connected to the pressure chamber of the master cylinder.

8. A brake device as in claim 7, further comprising a brake fluid control device which controls the brake fluid pressure in a different way based on the type of the failure detected by the failure detector,

the fluid pressure source device includes a master cylinder which has a pressure chamber and generates the fluid pressure corresponding to the input power, a first compressing device which compresses an operating fluid of the pressure chamber of the master cylinder and supplies a compressed operating fluid to the brake, a second compressing device which compresses the operating fluid stored in an atmospheric condition in a reservoir tank which is larger than the pressure chamber of the master cylinder, and

the brake fluid control device includes a brake condition selection device which selects either of a first condition in which the brake is compressed by the first compressing device, or a second condition in which the brake is compressed by the second compressing device based on the type of the failure.

9. A brake device having a fluid pressure source device which generates a fluid pressure based on operation of a brake operating member, the brake device actuated by the fluid pressure generated by the fluid pressure source, comprising:

a brake operating amount detector which detects an operating amount of the brake operating member,

a fluid source pressure detector which detects the pressure generated in the fluid pressure source device,

a failure detector which detects types of failures distinctively of the brake device based on the pressure detected by the fluid source pressure detector and the amount of the brake operation detected by the brake operating amount detector, and

a brake fluid control device which controls the brake fluid pressure in a different way based on the type of the failure detected by the failure detector.

10. A brake device as in claim 9, wherein the fluid pressure source device includes a master cylinder which generates the fluid pressure corresponding to the input power, and

the failure detector includes a bottoming detector which detects a bottoming condition in the master cylinder.

11. A brake device as in claim 10, wherein the brake operating amount detector includes an operation power detector which detects a power supplied to the brake operating member, and

the bottoming detector detects the bottoming condition based on whether an increasing gradient of the operation power detected by the brake operating amount detector is larger than the predetermined gradient or not.

5 12. A brake device as in claim 10, wherein the fluid source pressure detector includes a master cylinder pressure detector which detects a pressure of a pressure chamber of the master cylinder or a connected portion of the master cylinder,

10 the failure detector detects a small amount fluid leakage failure if the master pressure detected by the master cylinder pressure detector at the time when the brake operation detected by the brake operating amount detector is a first predetermined operation is larger than a first predetermined pressure, and a decreasing gradient of the master pressure detected by the master cylinder pressure detector is larger than the predetermined gradient, and

15 the brake fluid control device includes a leakage amount control device which increases a supplying amount of fluid to the brake if the failure detector detects a small amount fluid leakage failure, from a supplying amount of the fluid when a large amount fluid leakage failure is detected.

20 13. A brake device as in claim 10, wherein the fluid pressure source device includes a master cylinder which has a pressure chamber and generates the fluid pressure corresponding to the input power, a first compressing device which compresses an operating fluid of the pressure chamber of the master cylinder and supplies a compressed operating fluid to the brake, a second compressing device which compresses the operating fluid stored in an atmospheric condition in a reservoir tank which is larger than the pressure chamber of the master cylinder, and

25 the brake fluid control device includes a brake condition selection device which selects either of a first condition in which the brake is compressed by the first compressing device, or a second condition in which the brake is compressed by the second compressing device based on the type of the failure.

30 14. A brake device as in claim 9, wherein the fluid pressure source device is a master cylinder which has two pressure chambers and generates the fluid pressure corresponding to the input power, and includes the front side brake connected to one

of the two pressure chambers and a rear side brake connected to the other pressure chamber, and

the fluid source pressure detector includes a front wheel side pressure detector which detects the fluid pressure of the pressure chamber which is connected to the front wheel side brake or a portion connected to the pressure chamber of the master cylinder.

15. A brake device as in claim 9, wherein the fluid pressure source device

includes a master cylinder which has a pressure chamber and generates the fluid pressure corresponding to the input power, a first compressing device which

10 compresses an operating fluid of the pressure chamber of the master cylinder and

supplies a compressed operating fluid to the brake, a second compressing device

which compresses the operating fluid stored in an atmospheric condition in a reservoir tank which is larger than the pressure chamber of the master cylinder, and

the brake fluid control device includes a brake condition selection

15 device which selects either of a first condition in which the brake is compressed by the first compressing device, or a second condition in which the brake is compressed by the second compressing device based on the type of the failure.

16. A brake device having a fluid pressure source device which generates a fluid pressure based on operation of a brake operating member, the brake device

20 actuated by the fluid pressure generated by the fluid pressure source, comprising:

a brake operating amount detector which detects an operating amount of the brake operating member,

a fluid source pressure detector which detects the pressure generated in the fluid pressure source device,

25 a failure detector which detects types of failures distinctively of the brake device based on the pressure detected by the fluid source pressure detector and the amount of the brake operation detected by the brake operating amount detector,

the fluid pressure source device includes a master cylinder which generates the fluid pressure corresponding to an input power, and

30 the failure detector includes a bottoming detector which detects a bottoming condition in the master cylinder.

17. A brake device as in claim 16, wherein the brake operating amount detector includes an operation power detector which detects a power supplied to the brake operating member, and

the bottoming detector detects the bottoming condition based on whether an increasing gradient of the operation power detected by the brake operating amount detector is larger than a predetermined gradient or not.

18. A brake device as in claim 16, wherein the master cylinder has two pressure chambers and generates the fluid pressure corresponding to the input power, and includes a front side brake connected to one of the two pressure chambers and a rear side brake connected to the other pressure chamber, and

the fluid source pressure detector includes a front wheel side pressure detector which detects the fluid pressure of the pressure chamber which is connected to the front wheel side brake or a portion connected to the pressure chamber of the master cylinder.